US Army Corps of Engineers

RS/GIS

USACE Enterprise GIS and Real Estate

Real Estate & GIS Workshop
24-25 May 2005

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Army Engineer Research & Development Center
Hanover, NH 03755

http://rsgis.usace.army.mil

HQUSACE Enterprise GIS
EM 1110-1-2909 2-4.

- The HQUSACE EGIS is developed under the guidance of the Headquarters Project Delivery Team (PDT).
- The Headquarters PDT is committed to working together in the area of geospatial data and technology to decrease development costs for GIS functionality for USACE-wide Automated Information Systems.
- The implementation of HQUSACE EGIS is CorpsMap. CorpsMap is a spatial “portal” that accesses a variety of existing USACE-wide databases.
- CorpsMap is an Internet map-based display and information dissemination system for various USACE databases that have geographically based information in digital form.
- CorpsMap enables USACE information to be easily accessed, creates maps easily, and integrates disparate databases.

US Army Corps of Engineers

Columbia River Lock and Dam

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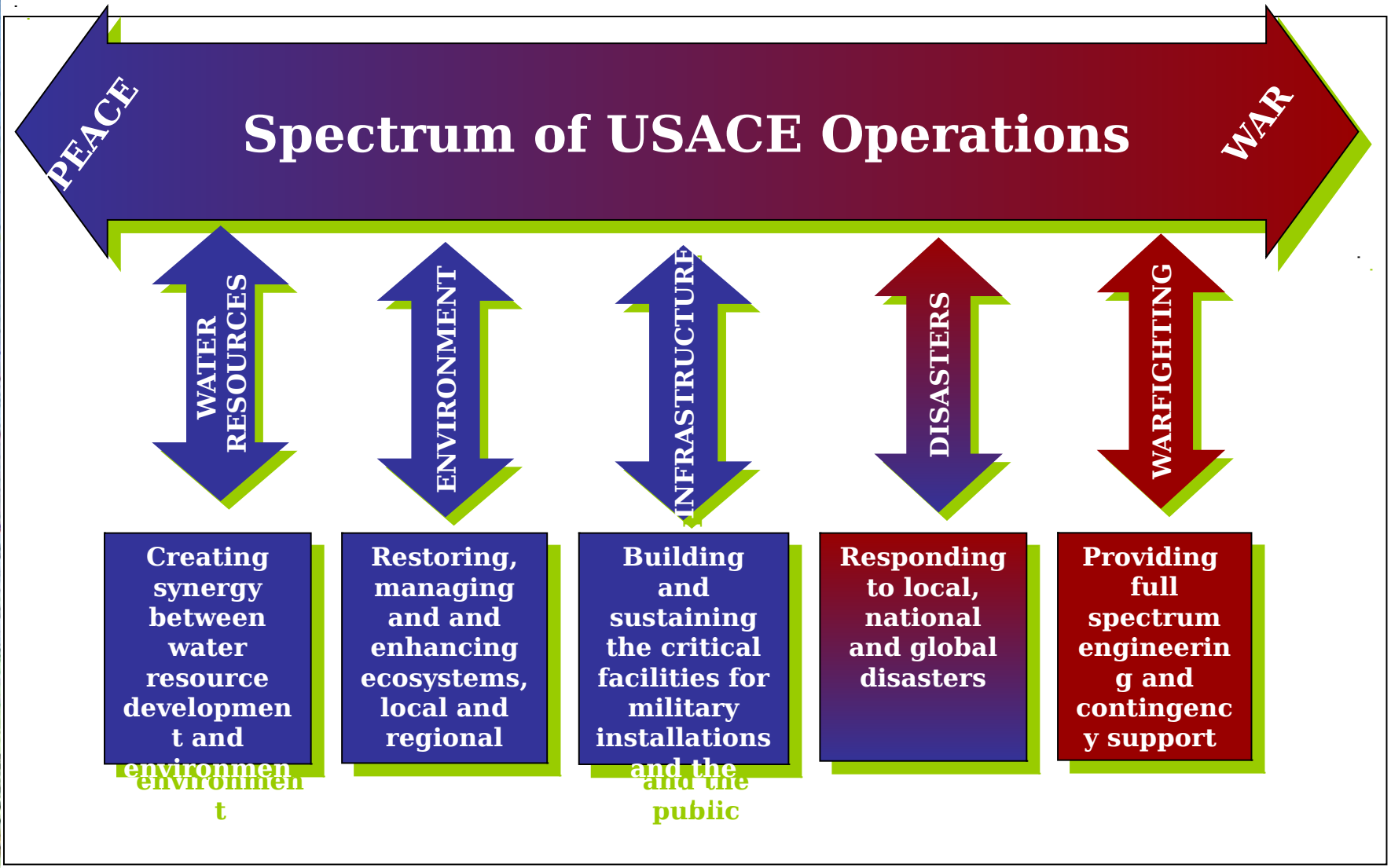
The US Army Corps of Engineers

Serving the Nation and the Armed Forces


PEACE
Spectrum of USACE Operations
WAR
WATER RESOURCES
ENVIRONMENT
INFRASTRUCTURE
DISASTERS
WARFIGHTING
Creating synergy between water resource development and environment
Restoring, managing and and enhancing ecosystems, local and regional
Building and sustaining the critical facilities for military installations and the pubiic
Responding to local, national and global disasters
Providing full spectrum engineering and contingency support

What's the vision?

Replace paper maps with electronic files?
Make high quality maps on demand?
Provide an accounting of all components of my property?
Develop a seamless data set representing all parcels for my property
Maintain a seamless data set representing all properties in my district
Deliver a seamless data set representing all properties in my division
Support a seamless data set representing all properties in USACE?
A seamless data set representing all properties in Army?
A seamless data set representing all properties in DoD?
A seamless data set representing all federal properties?

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Why?

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Anytime, anywhere location-based information access, applications, and decision support

Spatially enabled business process

GIS as a central and interoperable part of business information systems such as security, emergency operations, regulatory, planning, etc.

Embedded, transparent, ubiquitous, spatial data and application services

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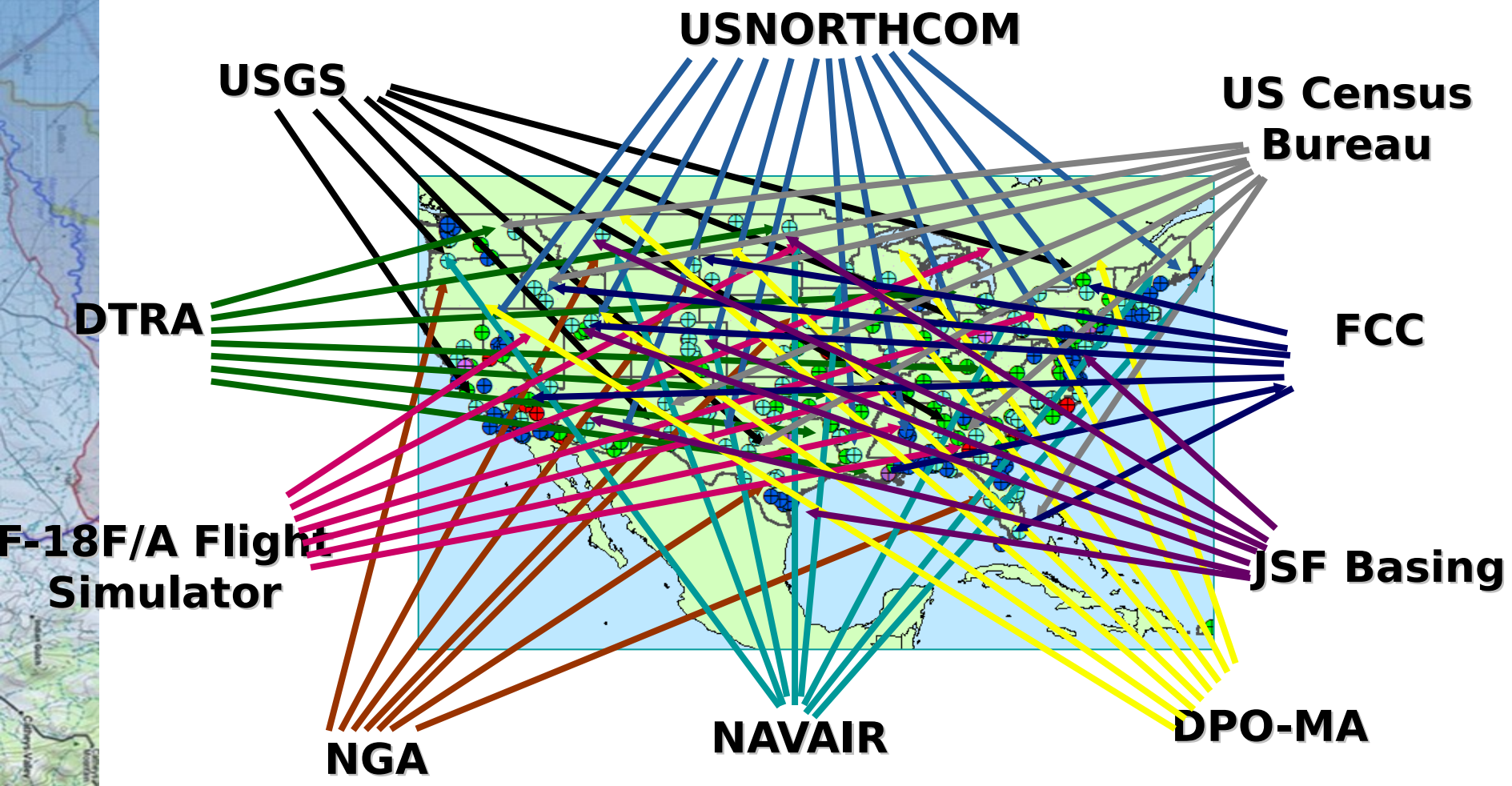
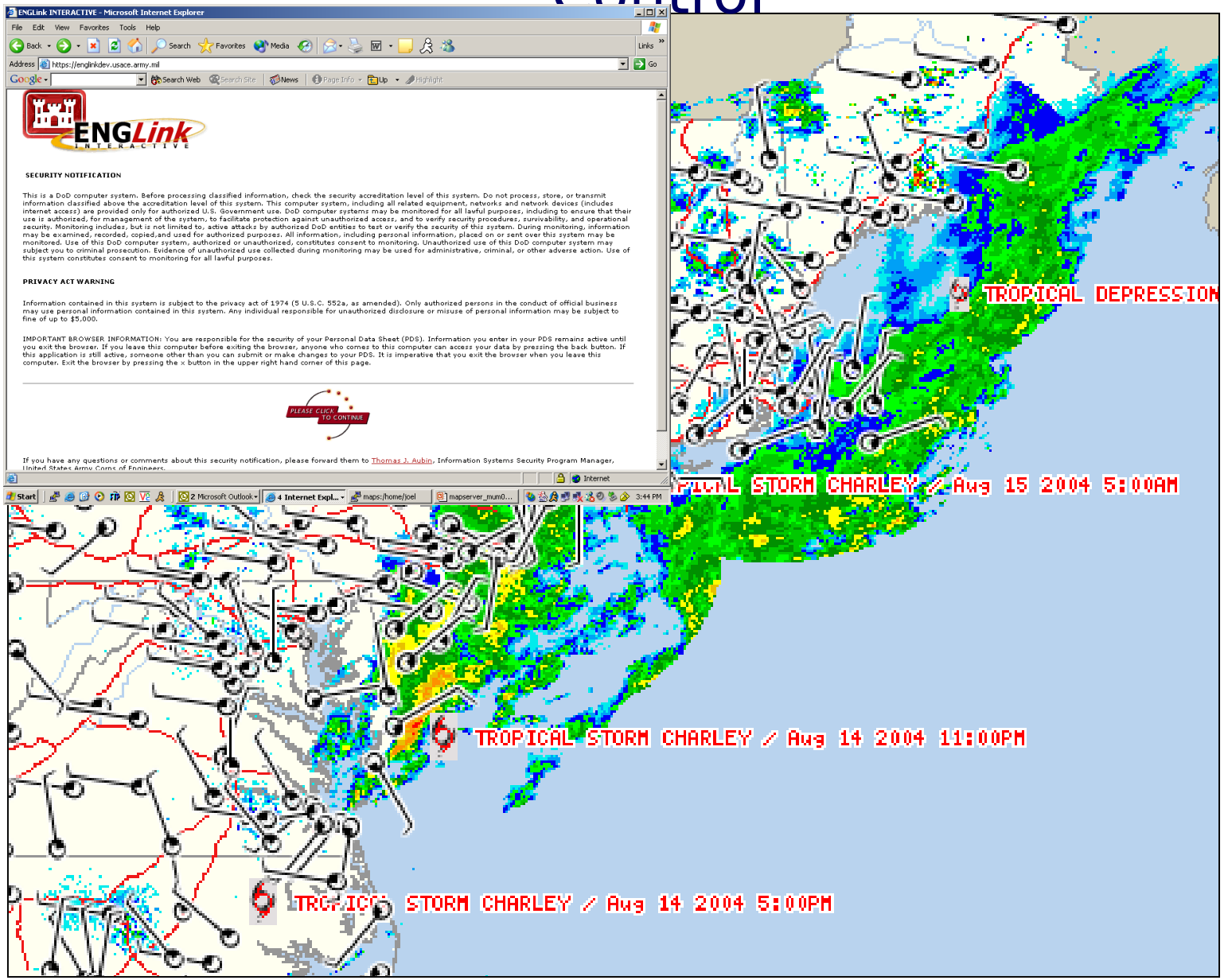
"Geodata Requirements and Discovery Chaos"

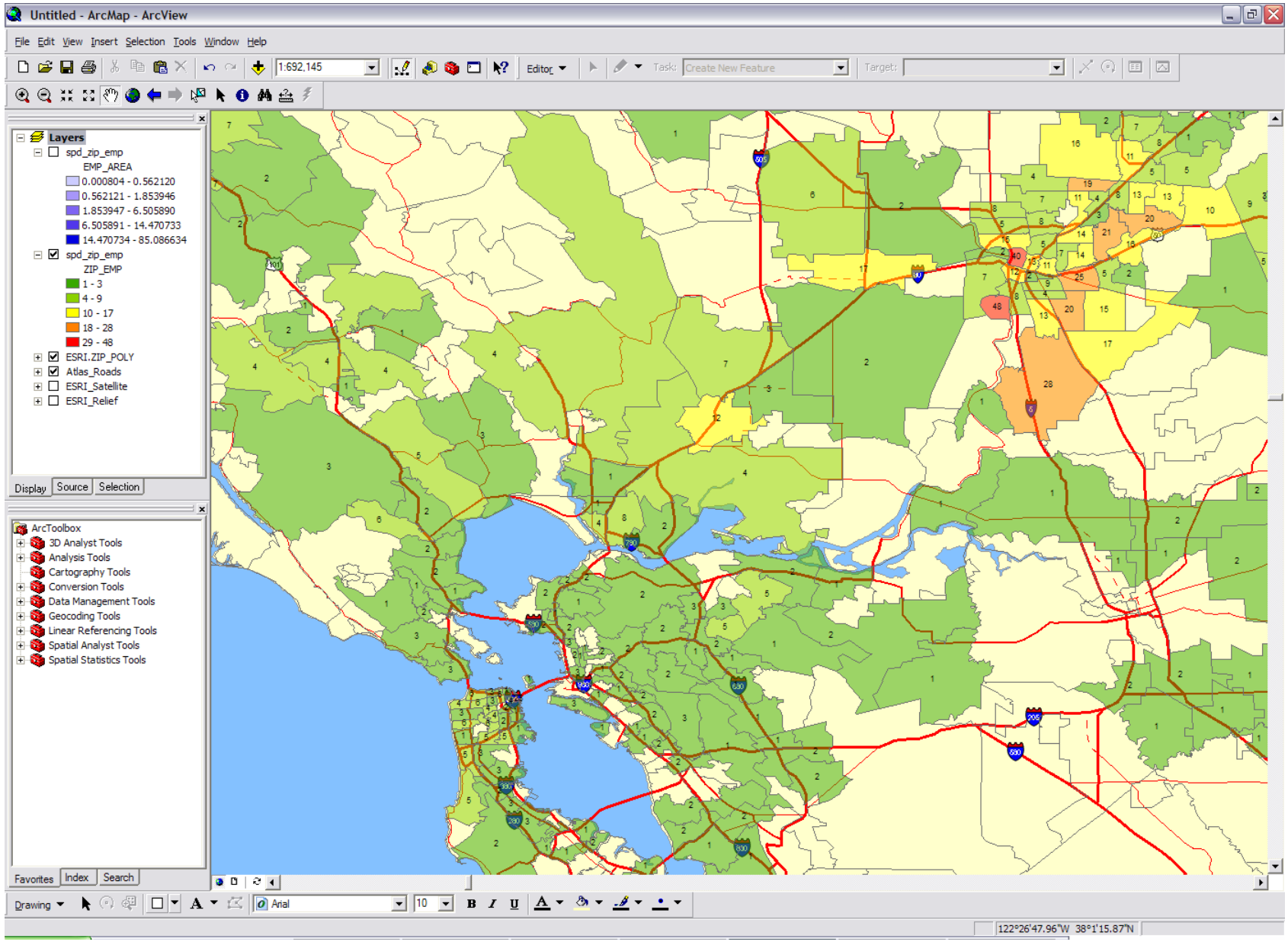


Slide from DISDI

Emergency Operations - Common Operating Picture - Command Control


ENGLink INTERACTIVE - Microsoft Internet Explorer
ENGLink
INTERACTIVE
SECURITY NOTIFICATION
PRIVACY ACT WARNING
PLEASE CLICK TO CONTINUE
TROPICAL DEPRESSION
TROPICAL STORM CHARLEY / Aug 15 2004 5:00AM
TROPICAL STORM CHARLEY / Aug 14 2004 11:00PM
TROPICAL STORM CHARLEY / Aug 14 2004 5:00PM

Count of SPD employee homes by Zip Code via PDS



Continuity of Operations / Continuity of Government

Continuity of Operations - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media Links

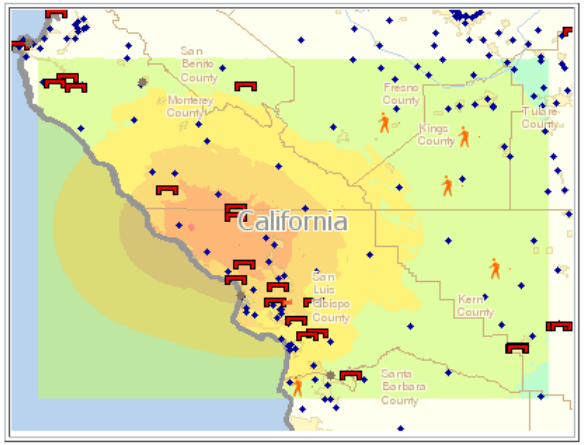
Continuity of Operations

In Support of ENGLink

USACE South Pacific Division

Events Reports

Earthquake Event 40148755, Epicenter: 11 km NE of San Simeon, CA



Asset Summary

Intensity Level	Employees	Population	Corps Properties	NID Dams	Corps Projects (DPN)
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	10	0	0
5	5	0	51	8	2
6	0	0	25	4	0
7	0	0	21	4	2
8	0	0	7	3	0

To get detailed information about assets affected for a particular Intensity Zone, click on the number in the table cell of interest.

NID Dams affected at Intensity Level 6:

Row	Dam Name	State Name	River	Owner
1	LOPEZ	CALIFORNIA	ARROYO GRANDE C	SAN LUIS OBISPO CO FCWCD
2	RIGHETTI	CALIFORNIA	W CORRAL DE PIE	ERNEST R RIGHETTI
3	TERMINAL	CALIFORNIA	TR ARROYO GRAND	SAN LUIS OBISPO CO FCWCD
4	SALINAS DAM	CALIFORNIA	SALINAS RIVER	DAEN-SPL

Applet main started

Unknown Zone (Mixed)

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Infrastructure Security

Advising on Critical Infrastructure Protection

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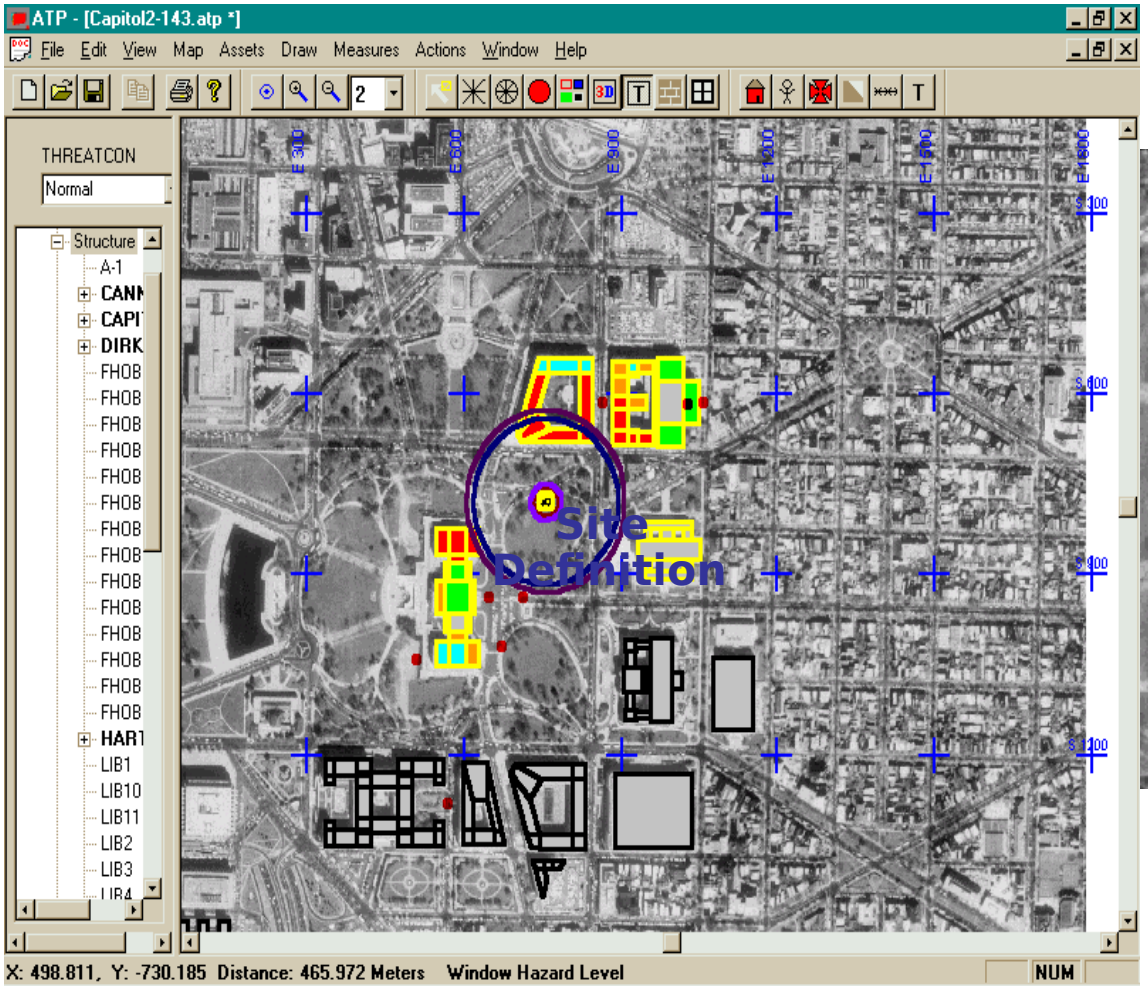
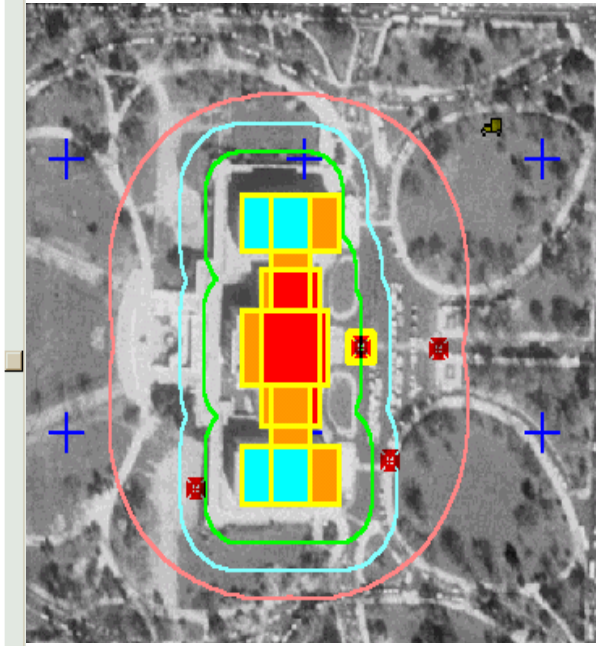
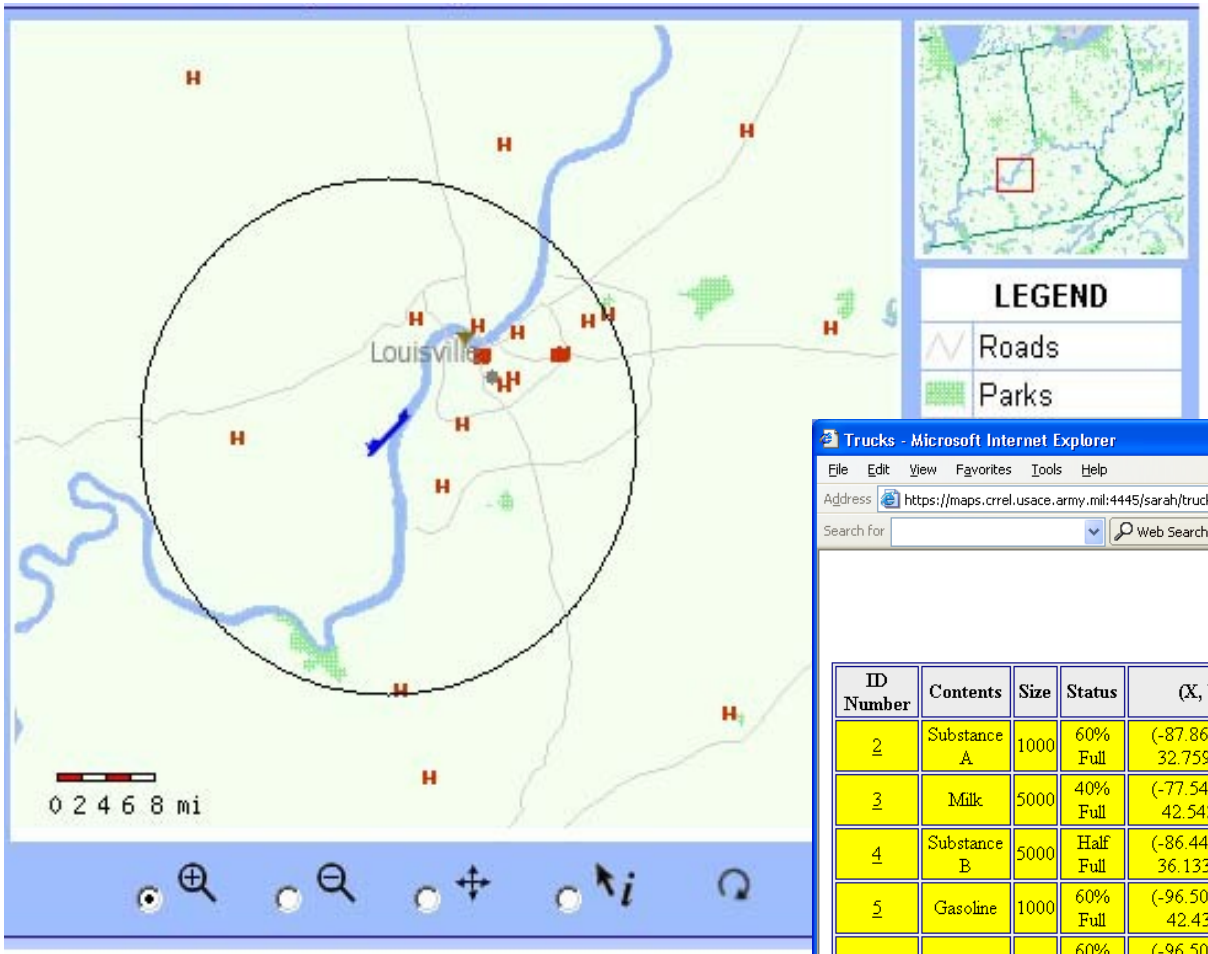




Threat Assessment



Trucks - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address https://maps.crrel.usace.army.mil:4445/sarah/trucks2.second_truck?cont=Milk&cont=Substance+A&cont=Substance+B&cont=Ga

Search for Web Search Popups blocked Rank: 355

Truck Information

ID Number	Contents	Size	Status	(X, Y)	County	Time Sent	Comments
2	Substance A	1000	60% Full	(-87.860272, 32.759649)	Hale, AL	15:53 08/11/04	Within 10 miles of Greene County Hospital
3	Milk	5000	40% Full	(-77.547702, 42.54232)	Steuben, NY	15:53 08/11/04	Within 10 miles of Nicholas Noyes Memorial Hospit
4	Substance B	5000	Half Full	(-86.443552, 36.133664)	Wilson, TN	15:53 08/11/04	Within 10 miles of University Medical Center Hosp
5	Gasoline	1000	60% Full	(-96.508527, 42.4362)	Dakota, NE	15:53 08/11/04	Within 10 miles of Marian Health Center
5	Gasoline	1000	60% Full	(-96.508527, 42.4362)	Dakota, NE	15:53 08/11/04	Within 10 miles of St Lukes Regional Medical Cent
13	Gasoline	1000	Full	(-83.74415, 40.055884)	Champaign, OH	15:53 08/11/04	Within 10 miles of Community Hospital Of Springfi
13	Gasoline	1000	Full	(-83.74415, 40.055884)	Champaign, OH	15:53 08/11/04	Within 5 miles of Mercy Memorial Hospital
17	Substance B	2500	20% Full	(-88.890706, 41.116757)	La Salle, IL	15:53 08/11/04	Within 5 miles of St Marys Hospital

Done Local intranet

Hazard Analysis

Trucks - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address https://maps.crrel.usace.army.mil:4445/sarah/trucks2.second_truck?cont=Milk&cont=Substance+A&cont=Substance+B&cont=Ga

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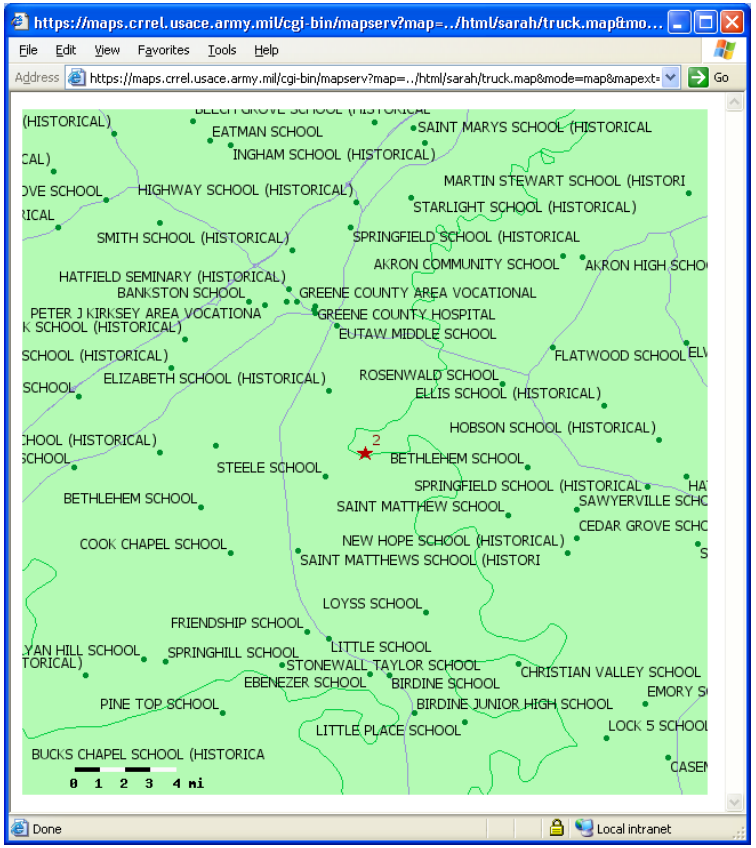
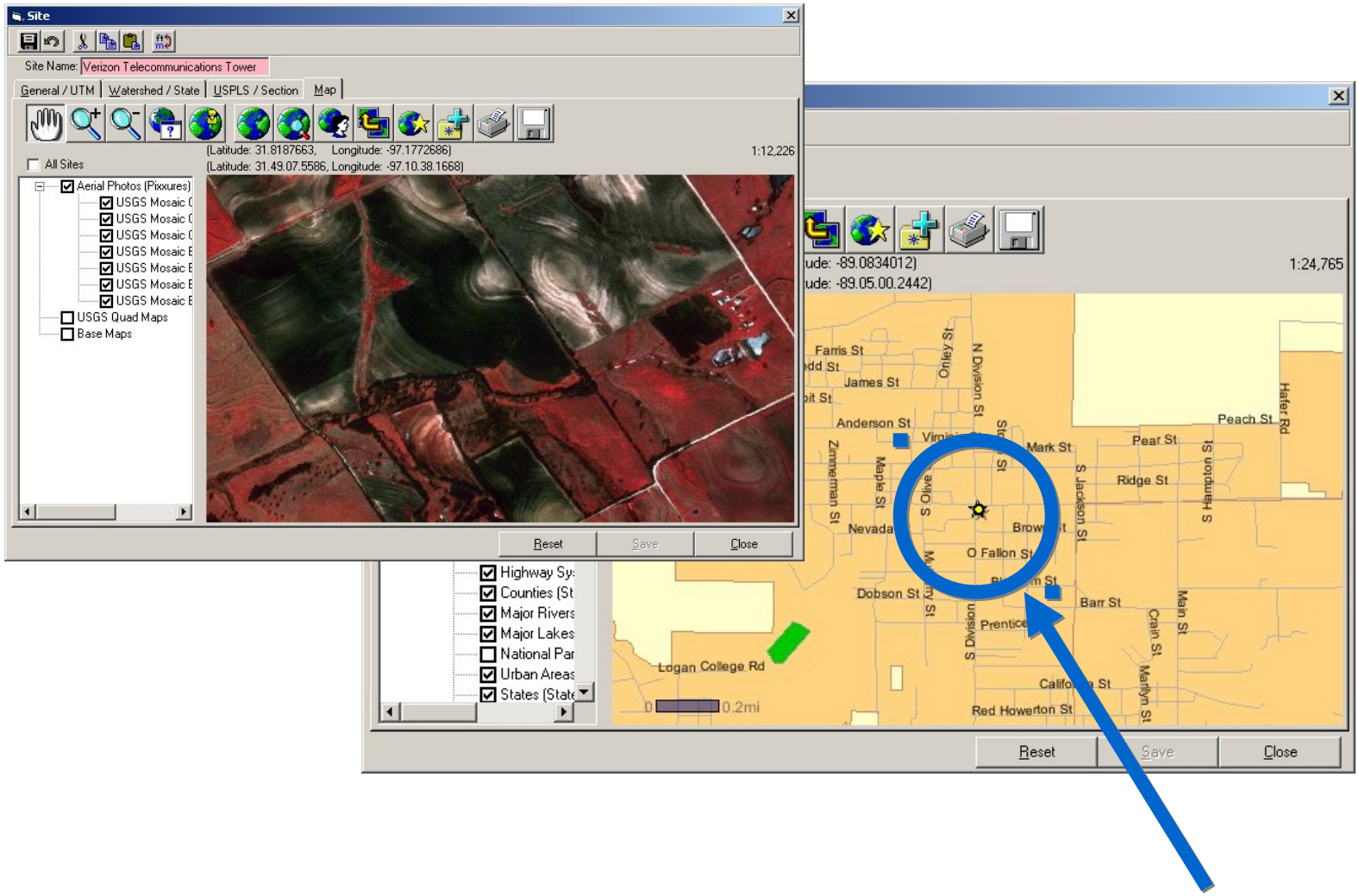
Done Local intranet

A map showing the area around the truck pops up when the truck id # is clicked.



This table was generated using the parameters the user designated. In this case, hospitals within 10 miles of any truck.

Requirements for watershed based analysis in OMBIL-ORM



Site Form Map Tab – Map centers on existing site location
Base (Native) Map Service View

US Army Corps of Engineers

System-Wide Multi-District Environmental Studies

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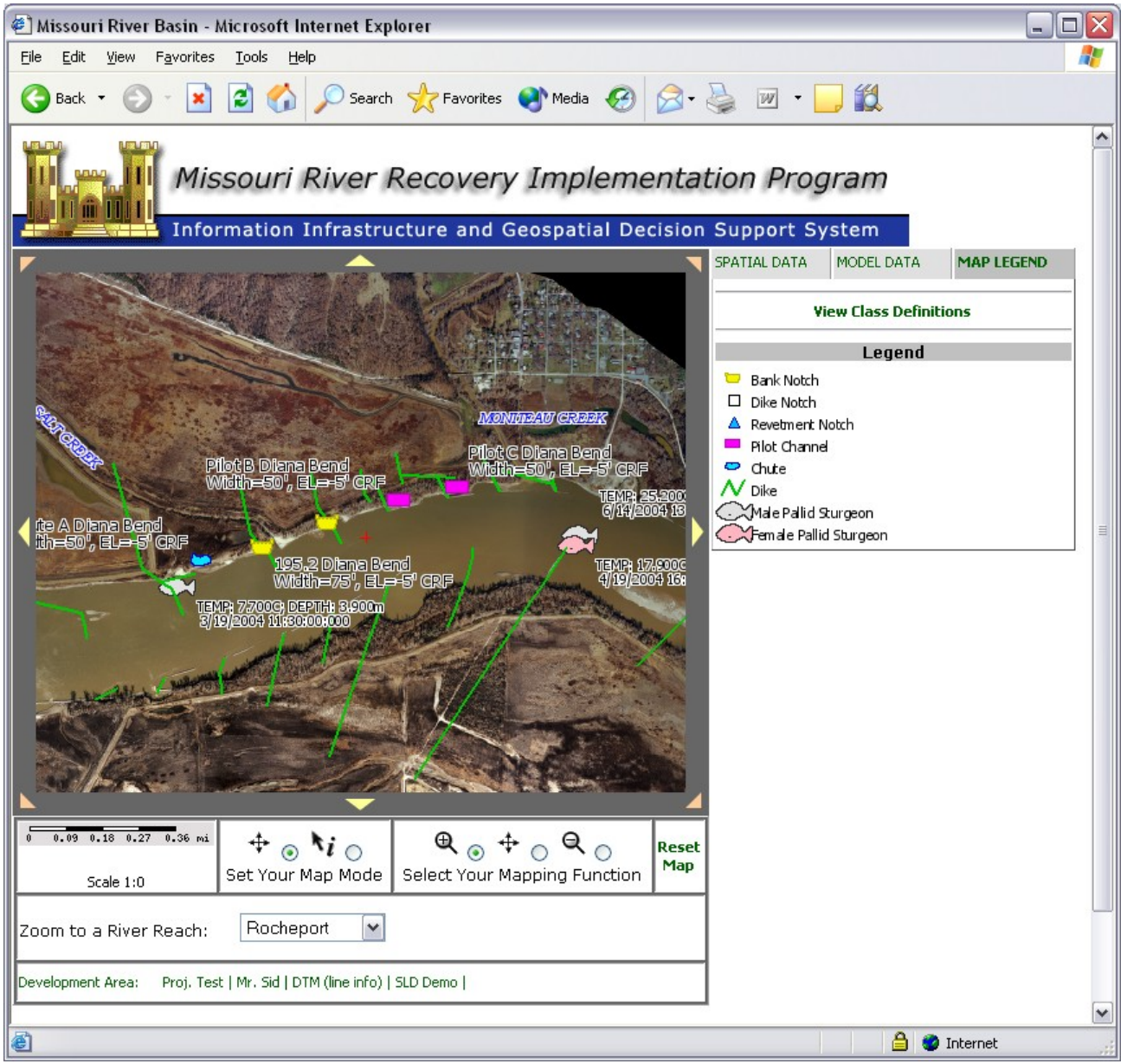


What We Need:

A single …

- Comprehensive (Complete)
- Spatially Precise
- Authoritative
- Consistent
- Temporally explicit

real estate for the Army Corps of Engineers

US Army Corps of Engineers®

RS/GIS

THE ARCGIS FEDERAL LANDS DATA MODEL

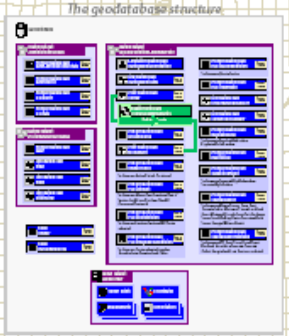
Legal description and ownership

Topology

The Catalog view

Administrative areas

Vector reference themes



NILS
National Integrated Land System

Directions in Enterprise Architectures & Interoperability for Geospatial Information

- ESRI Driven Architectures
  - "Enterprise GIS"
- Oracle Database Driven Architectures
  - "Geospatial Enterprise"
- OGC Driven Architecture
  - "Standardize on the Standards not on the Vendor"
- Service Oriented Architecture
  - "Loosely Coupled Web Services Bus"

SDE Server for Management of Seamless Nation-Wide GDT & Tiger Data Sets

US Army Corps of Engineers

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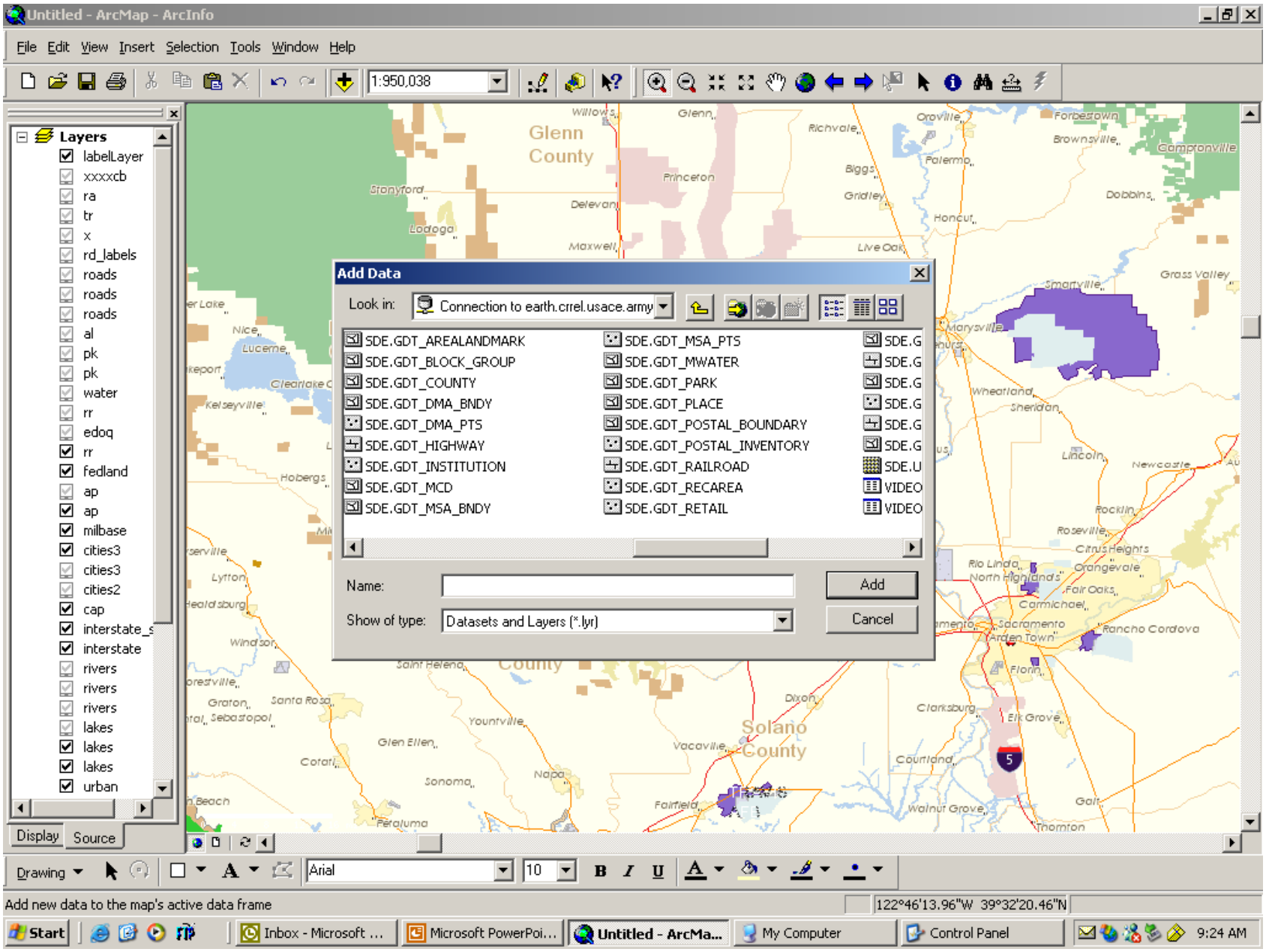
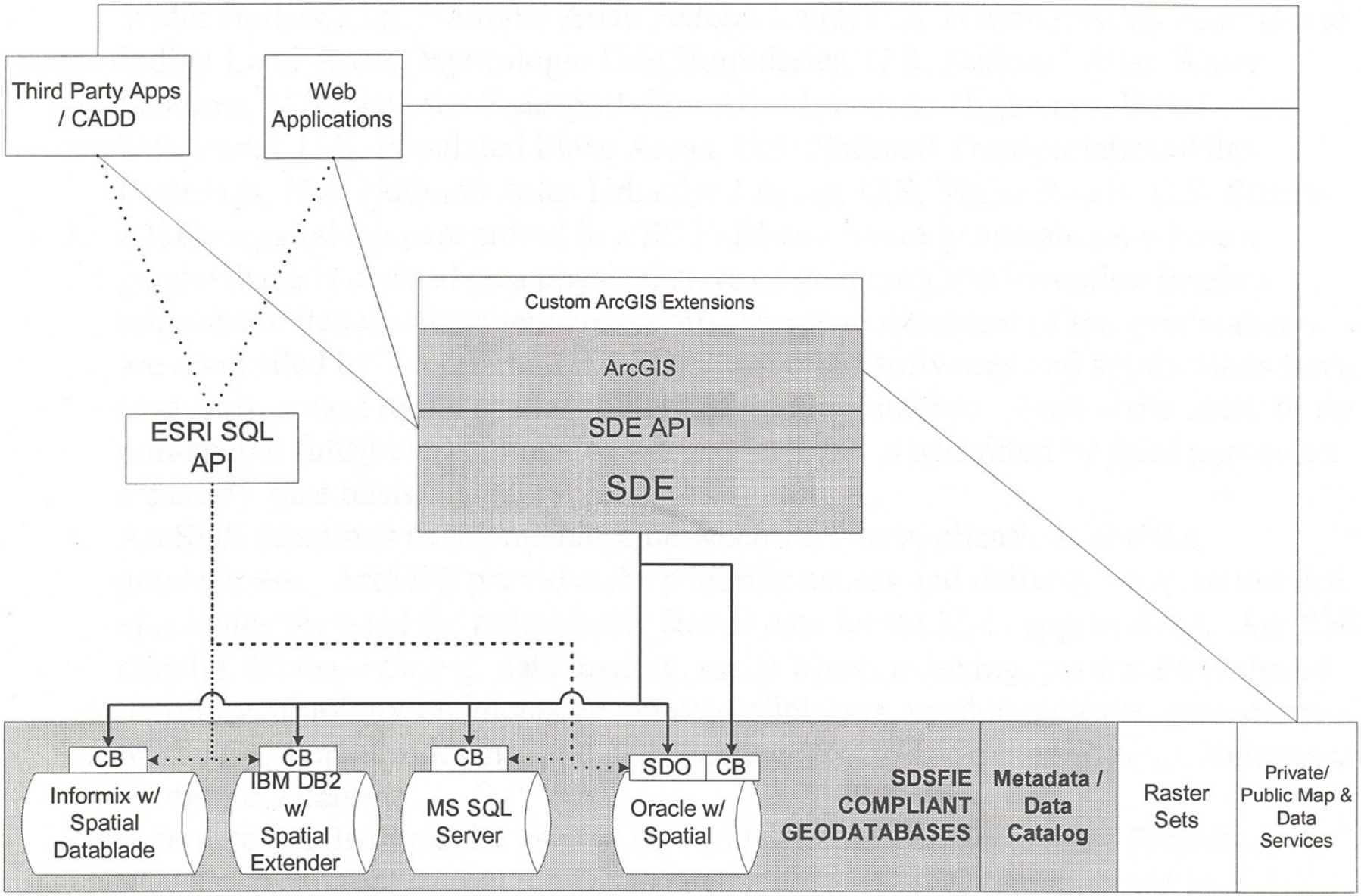
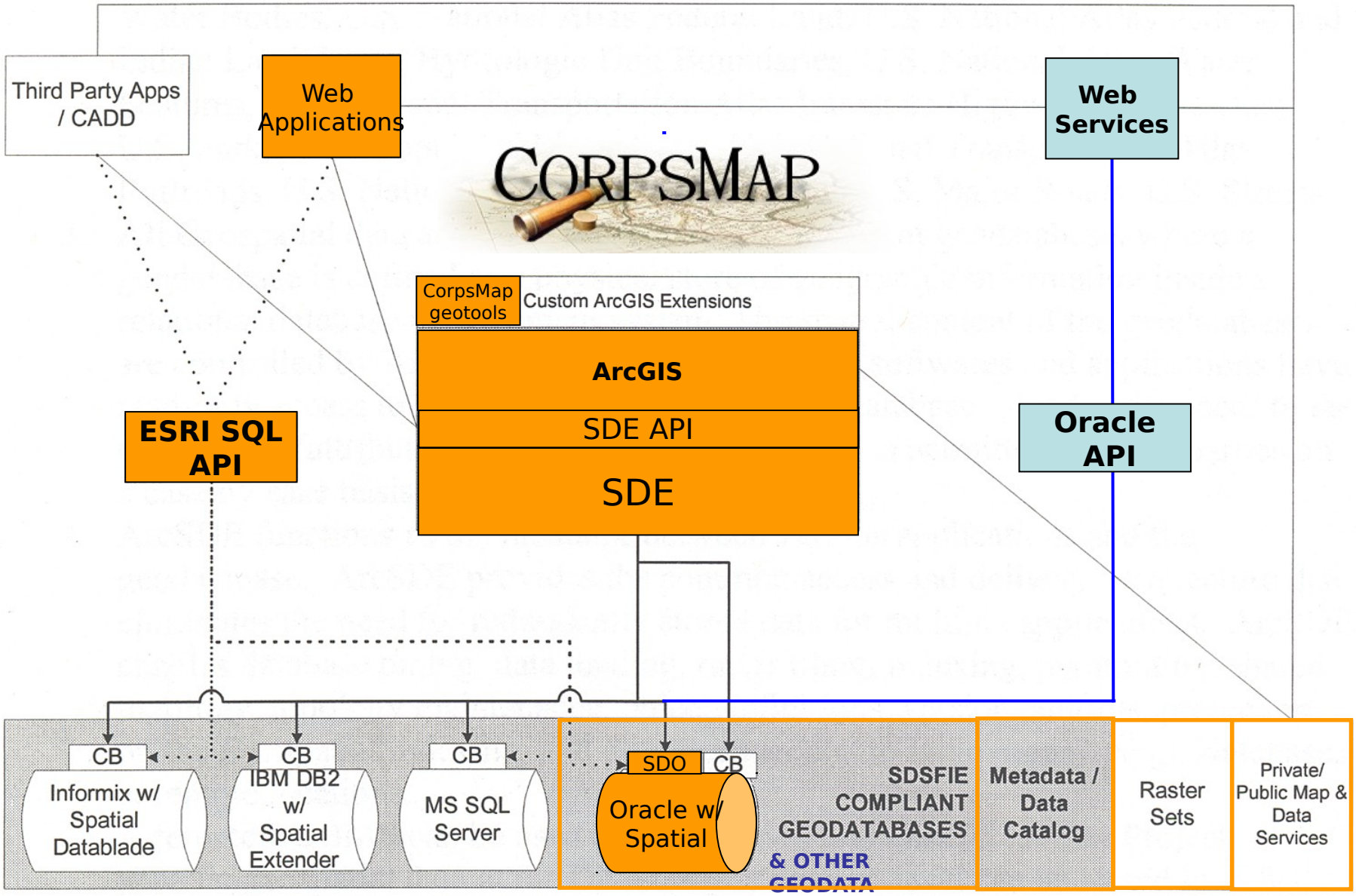


USACE Enterprise GIS Architecture



USACE Enterprise GIS Architecture

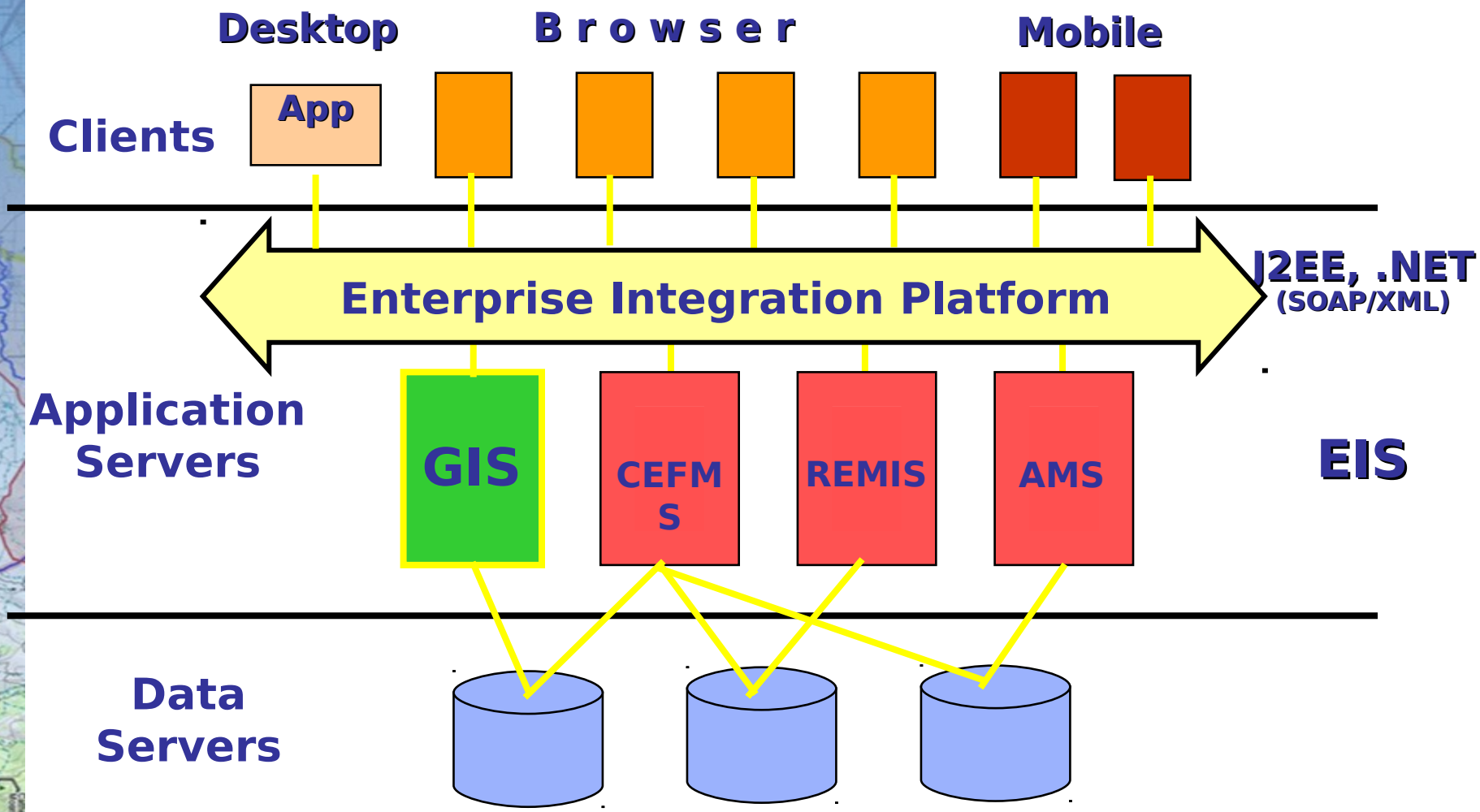


CorpsMap is built on the USACE eGIS Architecture

US Army Corps of Engineers

ESRI Driven Enterprise Architecture

RS/GIS

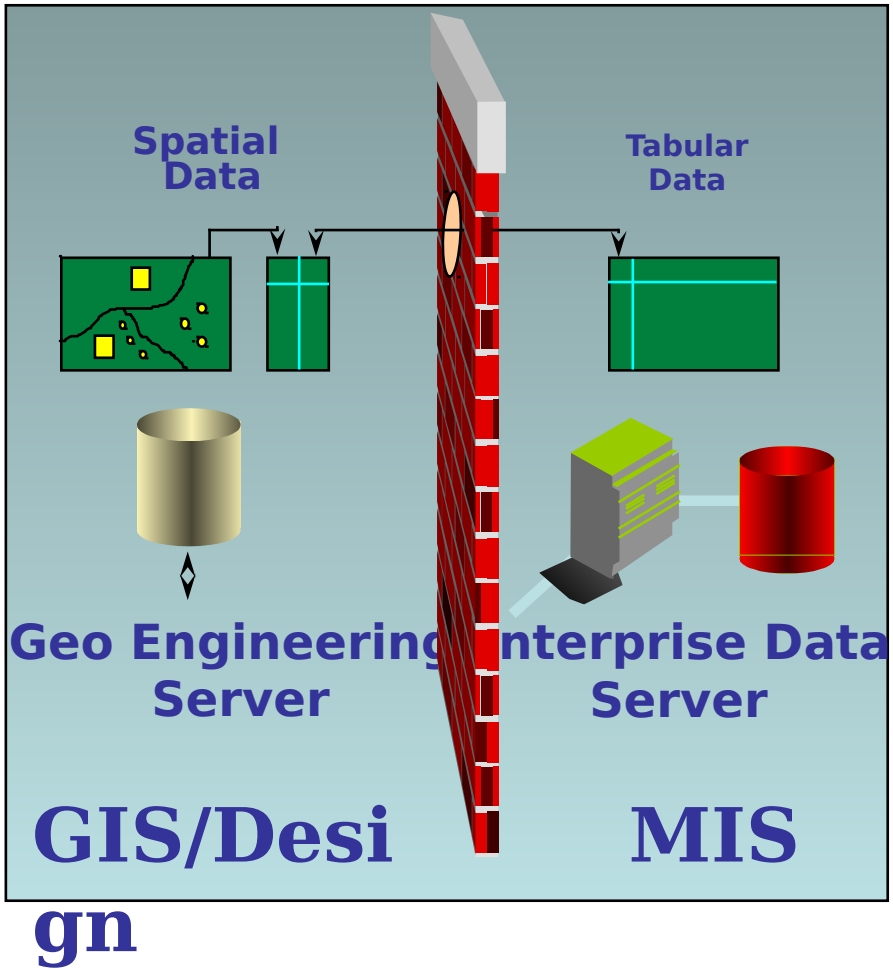


Support for ESRI Integrating Architecture

- All CorpsMap vector data are available as seamless SDE 8.x/9.x layers
- All CorpsMap maps views are available as ArcIMS Services
- All CorpsMap raster data are available as seamless ArcIMS Services
- ArcGIS users access CorpsMap using ArcCatalog
- Web Services are available in native ESRI formats
- CorpsMap has an ArcIMS Interface

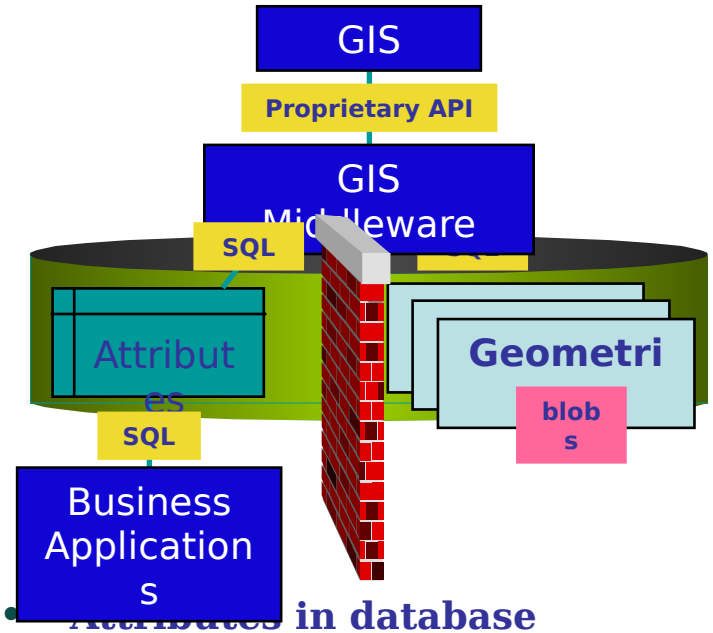
Challenge of Integrating GIS & RS Data within the Enterprise

- Specialty GIS/RS servers
  - Data isolation
  - High systems admin and management costs
  - Scalability problems
  - High training costs
  - Complex support problems
- Data tightly coupled to specific application
- Information not aligned with Business Processes



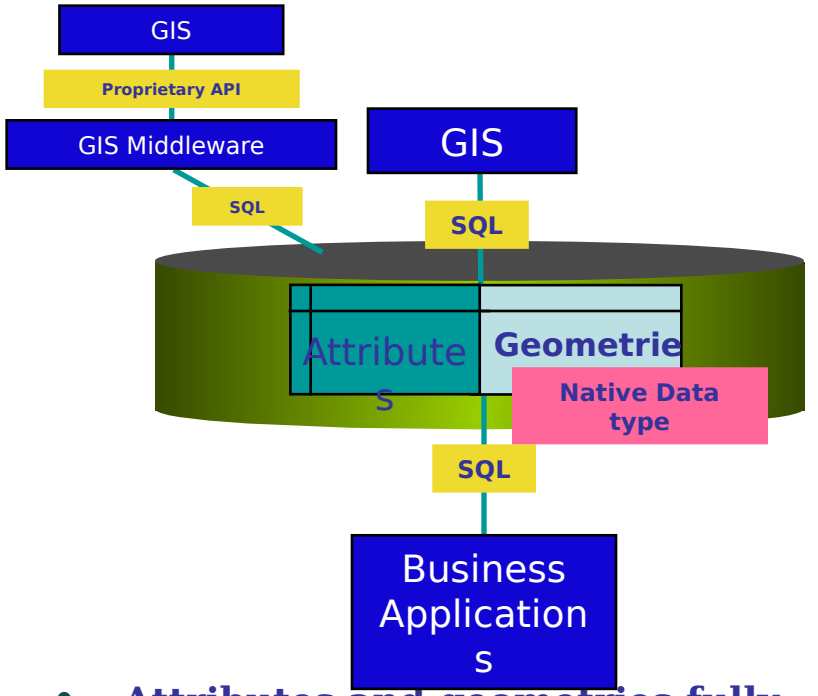
Spatial Enterprise Architectures

Middleware



- **Attributes in database**
- **Geometries in database - but in proprietary binary format**
- **IT can access geometries via proprietary interfaces only**
- **Poor integration**

Spatially Enable Databas

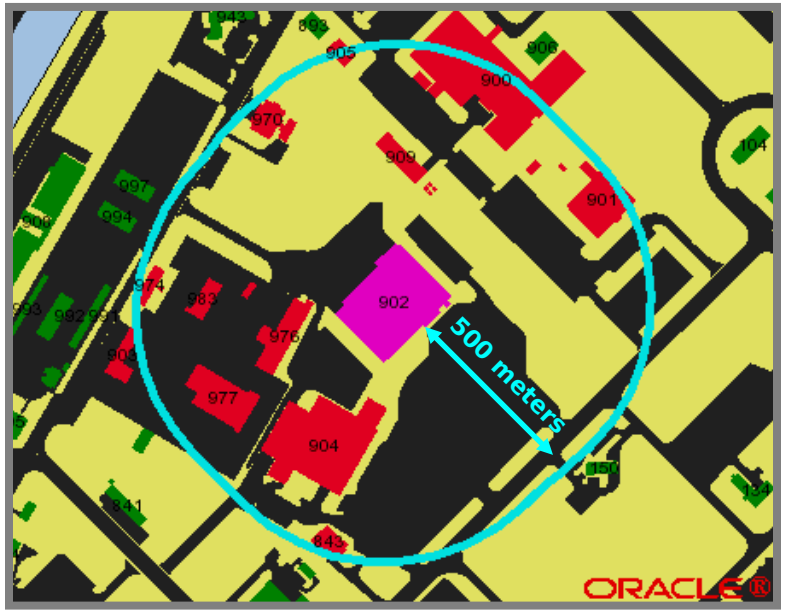


- **Attributes and geometries fully integrated in the database**
- **Spatial is native DBMS type**
- **Geometries accessible via open standards-based interfaces**

Spatial Query Via SQL

Find all building within 500 meters of building 902

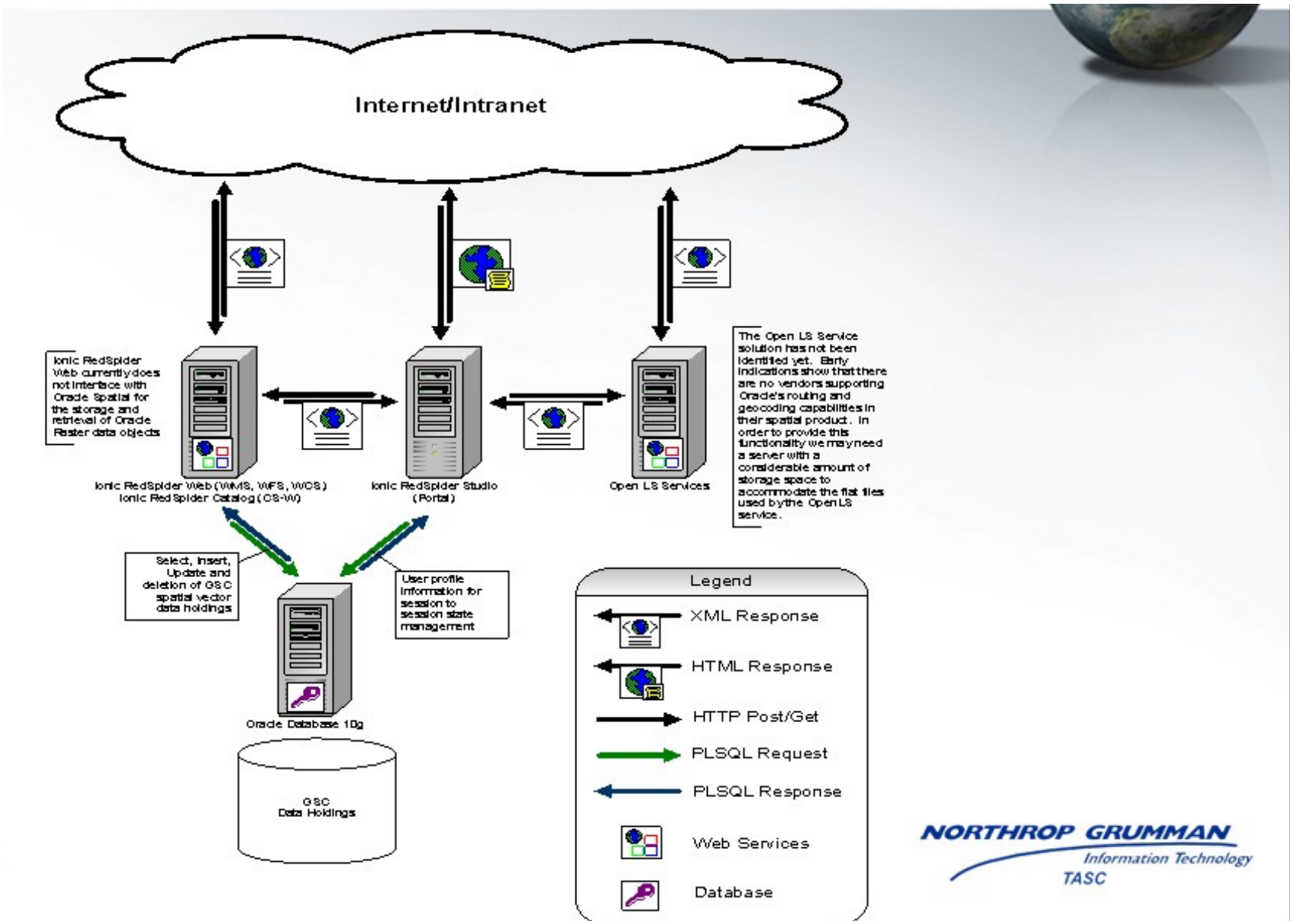
```
SQL> SELECT a.building_id
  2>   FROM base_buildings a,
  3>        base_buildings b
  4>  WHERE b.building_id = 902
  5>    AND MDSYS.SDO_WITHIN_DISTANCE(
  6>         a.Location, b.Location,
  7>         'distance=500') = 'TRUE';
```



Support for Oracle Integrating Architecture

- All CorpsMap vector data are available as Oracle Tables
- All vector geometry is stored as SDO_Geometry
- All CorpsMap vector data is available through straight SQL query or through Oracle API (OCI)
- Any CADD or GIS client that can access Oracle Geometry can use CorpsMap data
- CorpsMap supports materialized views, fine grained access control, and database level security for all data
- Raster data is not currently managed in the database.

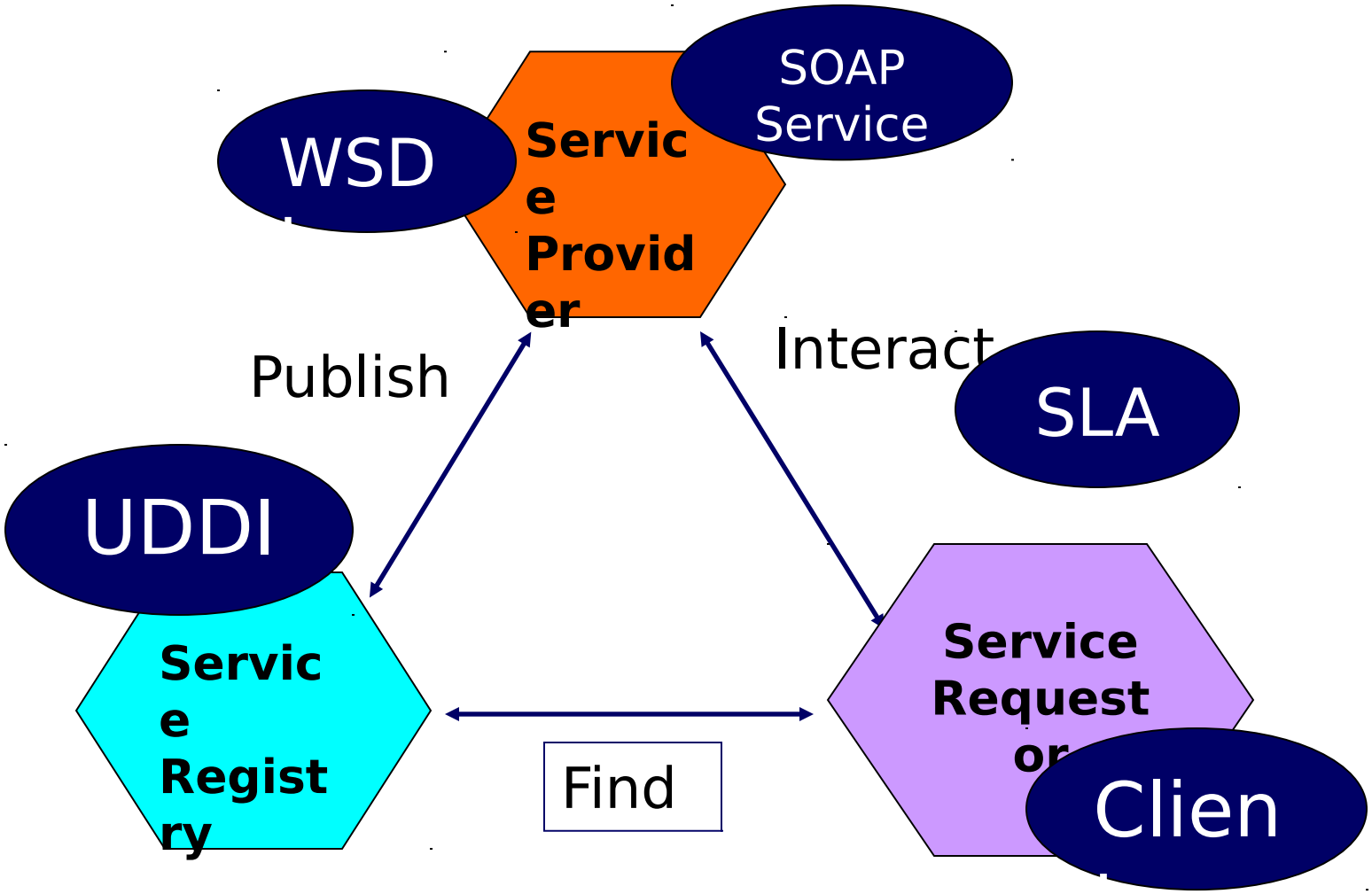
OGC Integrating Architecture
(Dept of Homeland Security)


Internet/Intranet
Ionic RedSpider Web currently does not interface with Oracle Spatial for the storage and retrieval of Oracle Raster data objects
Ionic RedSpider Web (WMS, WFS, WCS)
Ionic RedSpider Catalog (CS-W)
Ionic RedSpider Studio (Portal)
Open LS Services
The Open LS Service solution has not been identified yet. Early indications show that there are no vendors supporting Oracle's routing and geocoding capabilities in their spatial product. In order to provide this functionality we may need a server with a considerable amount of storage space to accommodate the flat files used by the Open LS service.
Select, Insert, Update and deletion of GSC spatial vector data holdings
User profile information for session to session state management
Oracle Database 10g
GSC Data Holdings
Legend
XML Response
HTML Response
HTTP Post/Get
PLSQL Request
PLSQL Response
Web Services
Database

Support for OGC Integrating Architecture

- All CorpsMap vector data are available as OGC Web Feature Services (WFS)
- All CorpsMap raster data are available as OGC Web Map Services (WMS)
- All CorpsMap map views are available as Web Map Services (WMS)
- CorpsMap supports Cascading of Web Map Services which can be used to integrate disparate data
- WCS, and Style Layer Descriptions (SLD) for 2005

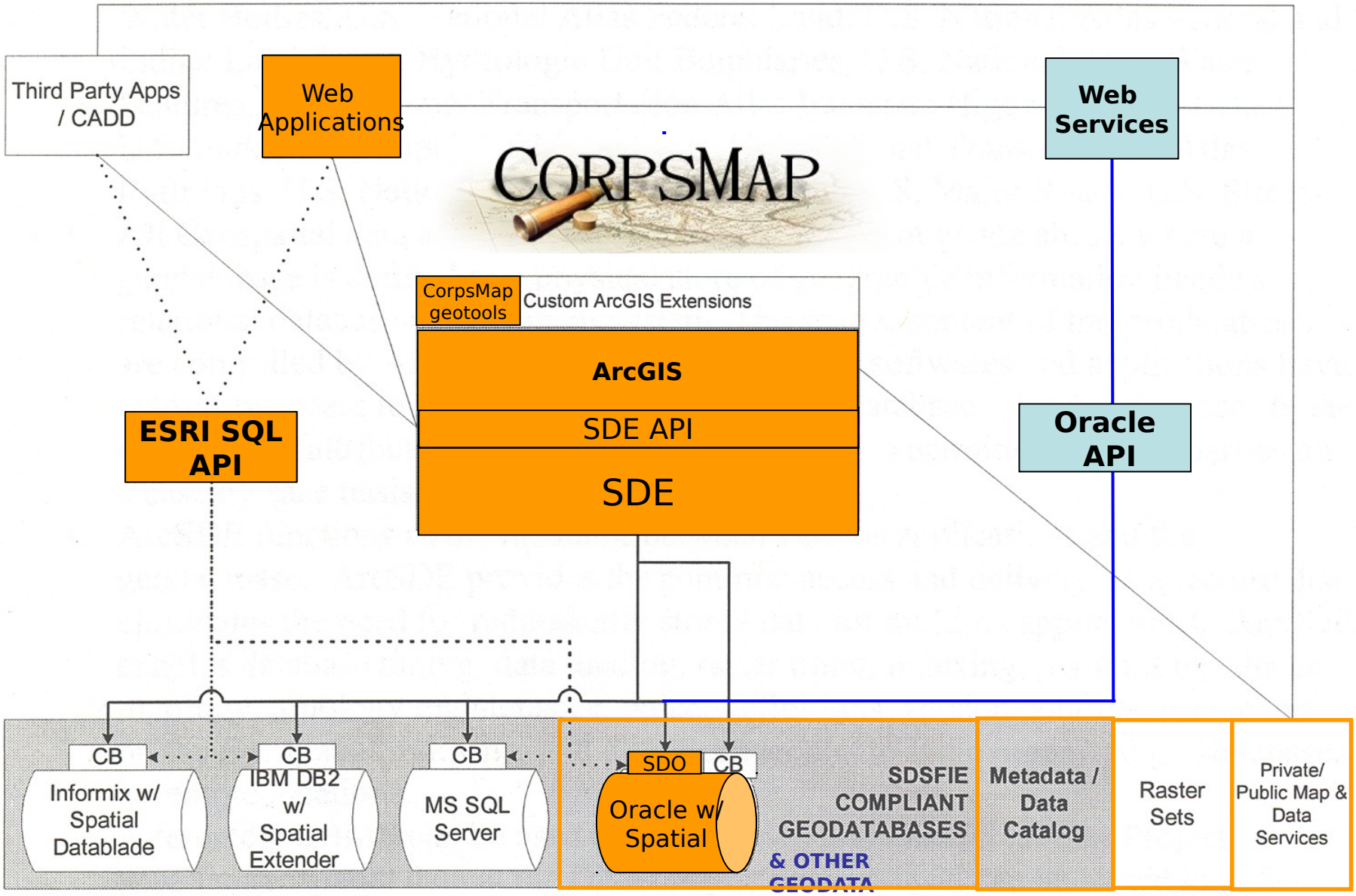
Service Oriented Architectures



Support for Service Oriented Architecture

- CorpsMap is not built using a SOA, but it fully supports integration via web services
- CorpsMap can consume as well as expose web services
- All CorpsMap data can be exposed as SOAP XML Services
- CorpsMap can be queried and controlled via Java Messaging Services (JMS)
- CorpsMap supports other integration standards such as CORBA
- CorpsMap supports native .NET interaction
- 50 geospatial query, discovery and retrieval services by end of 2005

USACE Enterprise GIS Architecture



CorpsMap is built on the USACE eGIS Architecture